

WHAT IS CLAIMED IS:

1. An ultrasonic vibrator comprising:  
a vibrating portion;  
a side wall portion standing on the principal surface of said vibrating portion; and  
a vibrator body disposed on the principal surface of said vibrating portion inside said side wall portion so as to apply ultrasonic vibration to said vibrating portion,  
wherein said vibrating portion has a thin portion formed at least in a part of the periphery of an area where said vibrator body is placed.

2. An ultrasonic vibrator comprising:  
a vibrating portion;  
a side wall portion standing on the principal surface of said vibrating portion; and  
a vibrator body disposed on the principal surface of said vibrating portion inside said side wall portion so as to apply ultrasonic vibration to said vibrating portion,  
wherein a thin portion is formed at least on a part of the border between said vibrating portion and said side wall portion.

3. An ultrasonic vibrator according to Claim 1,  
wherein the thickness of said vibrating portion is within the range of  $\lambda/2 \pm 0.3$  mm, where  $\lambda$  represents the wavelength

inside said vibrating portion of ultrasonic vibration applied from said vibrator body.

4. An ultrasonic vibrator according to Claim 2, wherein the thickness of said vibrating portion is within the range of  $\lambda/2 \pm 0.3$  mm, where  $\lambda$  represents the wavelength inside said vibrating portion of ultrasonic vibration applied from said vibrator body.

5. An ultrasonic vibrator according to Claim 1, wherein the frequency of the ultrasonic vibration is within the range of 20 kHz to 10 MHz.

6. An ultrasonic vibrator according to Claim 2, wherein the frequency of the ultrasonic vibration is within the range of 20 kHz to 10 MHz.

7. A wet-treatment nozzle for supplying a treatment liquid for wet treatment of a workpiece toward the workpiece and for discharging the waste treatment liquid after the wet treatment, said nozzle comprising:

a supply pipe having, at one end, an inlet for admitting the treatment liquid;

a drain pipe having, at one end, an outlet for draining the waste liquid to the outside; and

a connecting portion facing the workpiece so as to connect the other ends of said supply pipe and said drain

pipe,

wherein said connecting portion has a first opening which opens to said supply pipe and a second opening which opens to said drain pipe,

wherein a treatment region for the wet treatment that is filled with the treatment liquid is formed in a space between the opposing surfaces of said connecting portion and the workpiece by supplying the treatment liquid from said first opening toward the workpiece,

wherein said connecting portion includes an ultrasonic vibrator according to Claim 1 for applying ultrasonic vibration to the treatment liquid in said treatment region, and

wherein the waste liquid from said treatment region is guided from said second opening into said drain pipe and is drained through said outlet.

8. A wet-treatment nozzle for supplying a treatment liquid for wet treatment of a workpiece toward the workpiece and for discharging the waste treatment liquid after the wet treatment, said nozzle comprising:

a supply pipe having, at one end, an inlet for admitting the treatment liquid;

a drain pipe having, at one end, an outlet for draining the waste liquid to the outside; and

a connecting portion facing the workpiece so as to connect the other ends of said supply pipe and said drain

pipe,

wherein said connecting portion has a first opening which opens to said supply pipe and a second opening which opens to said drain pipe,

wherein a treatment region for the wet treatment that is filled with the treatment liquid is formed in a space between the opposing surfaces of said connecting portion and the workpiece by supplying the treatment liquid from said first opening toward the workpiece,

wherein said connecting portion includes an ultrasonic vibrator according to Claim 2 for applying ultrasonic vibration to the treatment liquid in said treatment region, and

wherein the waste liquid from said treatment region is guided from said second opening into said drain pipe and is drained through said outlet.

9. A wet-treatment apparatus comprising:  
a wet-treatment nozzle according to Claim 7; and  
a nozzle and workpiece relatively moving means for cleaning the entire treatment region of a workpiece by relatively moving said wet-treatment nozzle and the workpiece along the surface of the workpiece.

10. A wet-treatment apparatus comprising:  
a wet-treatment nozzle according to Claim 8; and  
a nozzle and workpiece relatively moving means for

cleaning the entire treatment region of a workpiece by relatively moving said wet-treatment nozzle and the workpiece along the surface of the workpiece.